

writer is acquainted. The subject is not an easy one, and the reader must bring a certain concentration of thought to its study; but once he has mastered these forty odd pages he will know the bearing of the critical phenomena on physical chemistry with a thoroughness that will leave little room for addition in his subsequent reading, except on matters of detail. The work of Young, Guye, Daniel Berthelot, Mathias, Guldberg, Traube—all receives consideration, and the impression left is one of harmony and completeness, at least from the practical empirical standpoint.

Boiling-points, latent heats and specific heats are next taken up, and the student will be surprised at many a new way of looking at old familiar facts. Under the heading of surface tension, the method of Eötvös and Ramsay and Shields for determining molecular weights is fully discussed, and a theoretical connection shown with Mathias's law of the rectilinear diameter. The section on physical properties concludes with a chapter on refractive indices and dielectric constants.

The second portion of the book is entitled, Relations between Chemical Properties and Composition. Its first subdivision treats of the affinities of elements as displayed in connection with their positive or negative character. The author's views on this important general question are summarised thus: Positive or negative character is defined as the tendency to combine with positive or negative electricity. The extreme positive and negative elements, such as sodium and chlorine, show the strongest affinities, which suggests that their opposite electrical charges play an active part in their chemical combination. Intermediate elements which are neither decidedly positive nor negative, e.g. carbon, often show a tendency to combine with themselves which is wanting in the extreme elements. As second consequence of the tendency to combine with electricity, we have the free production of atoms charged with electricity—the ions—in solvents like water which weaken the electrical attraction owing to their high dielectric constant. This breaking up or loosening in its turn entails a facility for reaction which is absent from intermediate elements, carbon compounds, for example, being characterised by great inertness in chemical action. Lastly, the phenomena of affinity are most marked when the atomic weight is small and the atomic volume large.

A study of the affinities manifested by explosive compounds and explosive mixtures is next entered on, and then the influence of the separate elements on the properties of compounds which they enter is taken up in detail. The concluding sections are on the changes in reaction velocity caused by certain elements and groups, and the appearance of entirely new chemical properties occasioned by the conjunction of certain elements.

On looking back through the book as a whole, one notes the circumstance that Parts i. and iii. are better done than Part ii., and that, on the whole, the physical portions are perhaps at a higher level of excellence than the chemical portions. It is everywhere evident, however, that the material has been wrought into form by a powerful thinker, who sees deeper and more clearly into his subject than any of his contemporaries.

A comparison of the English and French translations
NO. 1632. VOL. 03]

shows that the former, being more literal, is more difficult to follow than the latter. The freedom of translation in the French version is, however, not attained at the expense of accuracy; indeed, in more than one passage the sense of the original is better given in the French translation than in the English. To translate *dann* by "therefore" or even by "then," when it is merely used for the purpose of enumerating points of the argument (as in p. 89 of the original, and p. 98 of the English version), gives a false impression of logical sequence; and to translate *Affinitätsäusserungen* by "indications of affinity" (same page) is scarcely exact.

To the French version are appended two notes by the translator—one on Dieterici's modification of van der Waals's equation, the other on Kanonnikoff's "real density," derived from the formula of Lorentz and Lorenz.

Whilst strongly recommending the English version to all interested in physical chemistry, the writer would express the hope that in a future edition the three parts will be paged and bound as one volume, that the price will be reduced to a figure more suited to the size of the work and the means of the majority of students, and, finally, that the book will be provided with an index, the want of which in the present edition materially detracts from its usefulness.
J. W.

NEW MAPS AND ATLASES.

The "Diagram" Series of Coloured Hand Maps. Designed by B. B. Dickinson, M.A., F.R.G.S., and A. W. Andrews, M.A., F.R.G.S. (London: George Philip and Son, 1900.) Price 1s. per dozen maps.

Philips' London School Board Atlas. Edited by G. P. Philip, Jun., F.R.G.S. Pp. 36. (London: G. Philip and Son, 1900.) Price 1s.

The London School Atlas. Edited by H. O. Arnold-Forster, M.A. Pp. 48. (London: The London School Atlas Co., Ltd., 1900.) Price 2s., 3s. and 3s. 6d.

GOOD maps are essential to the success of geographical instruction. The best method of obtaining a true knowledge of the relation of the various land and water surfaces of the earth to one another, their relative dimensions, and their distribution in latitude and longitude, is by the use of a good terrestrial globe; but maps are indispensable even when globes are used, for they show in detail what can only be represented upon a small scale on a globe of the size used in schools. Each of the collections of maps, the titles of which are given above, has its good points, and all of them will assist in the intelligent teaching of geography.

The coloured hand maps prepared by Messrs. Dickinson and Andrews are the best orographical maps suitable for school use which have come under our notice. No names are printed upon the maps, but the elevations of the country are represented in five or six grades of colour, and the chief rivers are inserted. With maps such as these before him, a pupil can see at once how the general direction of river flow is determined by difference of level. He can, for instance, follow with intelligent interest the courses of the Ganges and Brahmaputra Rivers from the Himalayas down to their delta and the Bay of Bengal. The grades of colouring of

different levels of land show clearly that the directions taken by these rivers are the only possible courses for water running downwards to the sea. The course of the Amazon and its tributaries across South America can similarly be understood by a glance at the orographical map. There are thirty maps of this kind in the series, and they are uniform in excellence. They thus bring out prominently the importance of land elevation, and used as they are intended to be—for pupils to fill in the details of physical, political and commercial geography—they will be of real educational value. In the absence of relief or contour maps, the "Diagram" series of orographical maps provide an admirable introduction to the study of geographical science. To convey the idea of comparative size, Great Britain or the British Isles is represented in one corner of each map on the same scale as the map itself. The maps can be supplied as lantern slides, as well as in several forms suitable for school requirements.

Among the noteworthy characteristics of Mr. George Philip's atlas are its remarkable cheapness—the price is only 1s.—and the selection of important geographical features to which prominence is given. There are in the Atlas forty coloured plates, containing ninety maps and plans, and eight pages of introductory letterpress. Physical features are clearly represented, and the scale is stated under each map. The difficulty of distinguishing between political boundaries and lines bordering physical features has been successfully overcome by printing the former in distinct red lines. The maps have not the common defect of being overcrowded, and they are up to date both as regards the spelling of names and political divisions. To ensure that the pupil understands the meaning of a map, several views and plans are given side by side; and there are also maps of the County of London and the Thames Basin. These special supplementary maps can be modified to suit local requirements. There is no excuse for using obsolete maps filled with confusing and unnecessary details now an Atlas such as that by Mr. Philip is available.

The Atlas edited by Mr. Arnold-Forster is constructed upon the same intelligent principles as the preceding one; the maps are well drawn, beautifully coloured, not overcrowded, and the place-names have been carefully selected. Views, plans and sections are shown under one another in the introductory maps to provide lessons in map reading. There are also maps of the same district on different scales, illustrations of methods of showing elevation, as used in Ordnance Survey maps, and a reduced Admiralty chart of the Needles to show the method of sea-mapping. Several good astronomical diagrams show some of the phenomena connected with the rotation and revolution of the earth, but Map 8 is incorrectly designated the Solar System; for all that comes under this head in it are the earth in its orbit at the equinoxes and solstices, and the lines representing the relative lengths of the diameters of the sun, earth and moon. Following these maps are forty others upon which the various continents and countries of the world are represented according to their physical features or political divisions. Several maps are devoted to the representation of the growth of the British Empire. Dr. A. J. Herbertson contributes some notes on the

construction and reading of maps, and teachers will learn from them how the Atlas can best be used and appreciated.

The appearance of these Atlases at about the same time indicates, we hope, that more careful attention is to be paid to instruction in geography in the future than is now given in most schools. The maps represent the best that have yet been prepared at a low price for use by individual pupils, and their adoption can be recommended to all teachers of geography.

OUR BOOK SHELF.

Die Photographie im Hochgebirg. Von Emil Terschak. Pp. xv + 87. (Berlin: Gustav Schmidt, 1900.)

IN this neat little book of some 90 pages, the author gives the reader some practical hints, both in word and illustration, as to the road to success in mountain photography. The hand camera is now so generally used, owing to the rapidity of modern lenses, and there are so many of us who like climbing, and who always carry one of such instruments on our tours, that such a book as this, full of practical hints, will be welcomed. Mountain photography is quite an art in itself, and he who is a good picture-maker near the sea level does not necessarily meet with success when some thousand feet or so up. The effects to be portrayed at that height are of quite a different nature. There we have great contrasts of rock and sky, clouds lying at our feet, mists hanging about different hill-sides, and snow-capped peaks and glaciers adding to the beauty of the landscape.

Each of these cannot be immediately reproduced on the photographic plate without either a great experience in the class of work, or a careful study of the labours of others. In this book the author brings together in an enticing manner the chief points to be borne in mind when making a tour. He commences with useful information relative to the packing up of the camera, plates, &c., and then in turn treats of the several conditions under which the photographer is likely to work—such as photographing mountains from a valley or *vice versa*, mountain groups from a height, clouds, mists, &c. The author accompanies his remarks with numerous excellent reproductions from his own negatives, and in every case gives data, such as the kind of plate used, lens, stop, length of exposure, time of day and year. Every one who is familiar with the German language, and is interested in mountain photography, will be sure to find this a serviceable book.

An Introduction to Vegetable Physiology. By J. Reynolds Green, Sc.D., F.R.S., Professor of Botany to the Pharmaceutical Society of Great Britain. Pp. xx + 459. (London: J. and A. Churchill, 1900.)

ONE of the needs most widely felt in modern botanical literature has been that of a good intermediate book dealing with vegetable physiology. Although several standard works dealing with this branch of botany are already in existence, they are for the most part of too advanced a character to be of much use to a junior student. It is a matter for gratification that the task of providing such a treatise should have fallen into such good hands as those of Prof. Green, by whom, as might have been expected, the subject-matter has been skilfully handled and admirably illustrated. By wisely avoiding excessive detail, and by duly emphasising from different points of view the various matters of special importance, the author has succeeded in producing a really excellent student's book, whilst the general reader will find the principal topics of current physiological interest presented in a lucid and interesting manner.